

Notice of Allowability

Application No.

10/671,750

Examiner

Angela J. Martin

Applicant(s)

KEEFER ET AL.

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1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 11/28/06.
2. ☒ The allowed claim(s) is/are 1,4,7 and 12-16.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☒ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☒ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date 3/30/07.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____ |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____ |

EXAMINER'S COMMENT

Drawings

1. New corrected drawings in compliance with 37 CFR 1.121(d) are required in this application because the handwriting in Figs. 8-12, 22-27, is informal. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

REASONS FOR ALLOWANCE

2. The following is an examiner's statement of reasons for allowance:

The Applicant claims a high temperature fuel cell system comprising an anode channel, an anode inlet and an anode outlet, a first anode channel portion proximal to the anode inlet, a second anode channel portion proximal to the anode outlet, and a gas separation means operable to enrich a first hydrogen gas component of an anode exhaust gas exiting the anode outlet to produce a first product gas enriched in the said first hydrogen gas component such that at least a portion of the first product gas enriched in the hydrogen gas component can be provided as a portion of a fuel mixture supplied to the anode inlet, wherein; the first anode channel portion comprises an anode material that is resistant to carbon deposition and active for direct oxidation of hydrogen, at least one hydrocarbon fuel or mixtures thereof; and the second anode channel portion comprises an anode material that is catalytically active for steam

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reforming of at least one hydrocarbon; and the fuel mixture comprises steam, hydrogen and optionally at least one hydrocarbon fuel, wherein steam and hydrogen are present in proportions of no more than 1.5 moles of steam per mole of hydrogen or the molar ratio of steam to hydrocarbon fuel in the mixture is no greater than 1.5 to 1.

Applicant claims a method of operating a fuel cell system, the fuel cell system comprising an anode channel, an anode inlet and an anode outlet, a first anode channel portion proximal to the anode inlet, a second anode channel portion proximal to the anode outlet, and a gas separation means, wherein the first anode channel portion comprises an anode material that is resistant to carbon deposition and active for direct oxidation of hydrogen, at least one hydrocarbon fuel or mixtures thereof, and the second anode channel portion comprises an anode material that is catalytically active for steam reforming of at least one hydrocarbon, the method comprising: introducing an anode exhaust gas exiting the anode outlet into the gas separation means to produce a first product gas enriched in the a hydrogen gas component; and introducing the first product gas enriched in the hydrogen gas component as a portion of a fuel mixture supplied to the anode inlet, wherein the fuel mixture comprises steam, hydrogen and optionally at least one hydrocarbon fuel, wherein steam and hydrogen are present in proportions of no more than 1.5 moles of steam per mole of hydrogen or the molar ratio of steam to hydrocarbon fuel in the mixture is no greater than 1.5 to 1.

In the prior art of record, Muradov, U.S. Pat. No. 6,653,005 B1, teaches a high temperature fuel cell system comprising pure hydrogen feed stream introduced into the anode inlet.

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However, the prior art of record, taken alone or in combination, fails to disclose or render obvious a fuel mixture that includes steam, hydrogen, and optionally at least one hydrocarbon fuel, wherein steam and hydrogen are present in proportions of no more than 1.5 moles of steam per mole of hydrogen or the molar ratio of steam to hydrocarbon fuel in the mixture is no greater than 1.5 to 1.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Angela J. Martin whose telephone number is 571-272-1288. The examiner can normally be reached on Monday-Friday from 9:00 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AJM


DAHWEIYUAN
PRIMARY EXAMINER